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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/591,532	06/09/2000	David Robert Baldwin	TD-152	4374

7590 07/28/2003

Robert Groover 9Patent Docketing)
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EXAMINER

FOULADI SEMNANI, FARANAK

ART UNIT	PAPER NUMBER
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2672

DATE MAILED: 07/28/2003

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/591,532

Applicant(s)

BALDWIN, DAVID ROBERT

Examiner

Faranak Fouladi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 09 April 2003 is: a) ☒ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

1. This action is responsive to communications: application, filed on 06/09/2000; IDS, Paper # 5, filed on 01/22/01; Amendment A, filed on 4-09-03.
2. Claims 1-7 are pending in the case, with claims 1, 3, 6, and 7 being independent.
3. The present title of the application is "Direct-Mapped Texture Caching with Concise Tags" (as originally filed).

Specification

4. The disclosure is objected to because of the following informalities:
 - Page 5 of Amendment A, first paragraph has been repeated in second paragraph. Second paragraph needs to be deleted.
 - Amendment A does not include the last paragraph on page iv of marked-up version of amendment A.
 - Amendment A does not include the first paragraph on page v of marked-up version of amendment A.
 - Page v of marked-up version of Amendment A, first paragraph has been repeated in second paragraph. Second paragraph needs to be deleted.
 - The term "tag" used in claims is inconsistency with specification.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

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The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1, 2, 4-7 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

- There is no description for " $2^{J-1}+1$ " and " 2^K " in the specification. What is the range for K? What is the range for J? Can they be any number?
- There is no description for "map level identifier", " $((m-i)+(n-j))$ ", " $((m-i)+(n-j)-2)$ ", and " $m+n-1$ " in the specification. What is the range for m and n in " $((m-i)+(n-j))$ ", " $((m-i)+(n-j)-2)$ ", and " $m+n-1$ "?

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 2-3 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Regarding dependent claim 2, "...wherein said step (c) exploits an interrelationship between the number of possible values of said coordinate bits for some values of said mip-mapping-level-of-detail parameter." using the phrase "some values of" makes the claim unclear and confusing.

8. Regarding independent claim 3, "a graphic processing method, comprising caching texture memory fetches using a cache tag assignment in which a unique relation defines a smaller tag address for any given memory address." It is not clear that a unique relation between what (parts or parameter) defines a smaller tag address?

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

9. Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by US Patent 6,288,730 to Duluk, Jr. et al, hereafter Duluk.

10. Regarding independent claim 1, "a graphic processing method, comprising the steps of:

- a. Caching texture memory fetches, using a cach tag assignment which is essentially unique mapped, (Duluk disclose in col. 15 line 65 – col. 16 line 19) while
- b. Generating condensed cash tags, corresponding to said cach tag assignment, by combining a mip-mapping-level-of-detail parameter which can have at least $2^{J-1}+1$ different values together with coordinate bits which can have as many as 2^k different values into fewer than $J+K$ bits without loss of information (Duluk disclose in col. 11 line 30– 33)
- c. And using said condensed tags for said caching step (a.) (Duluk disclose in col. 12 line 3–23)" .

Duluk disclose in col. 11 lines 3–33 and in Fig. 9 "The LOD 1182 field is a 4 bit field that defines the LOD to be used in the selected texture map. The U, V fields 1183 and 1184 are 11 bit fields for texture coordinates with a range from 0-2047." Duluk has disclosed a range from 0-2047 for texture coordinate and it means the maximum width of the texture map is 2048 which is 22 bits (11 for each index) and anything within the range can be used. If 2048 is the maximum width then the LOD 0 is a 2048x2048 array, LOD 1 is a 1024x1024 array, LOD 2 is a 512x512 array and... LOD 11 is 1x1 array. Since mip maps are always in a power of 2 in size then map level 0

is not a mipmap. Therefore any number of maps greater than 1 may be used for mip mapped sampling and if we formulate this fact in to an equation the result would be " $2^{J-1}+1$ ".

Duluk has also disclose 4 bit field for LOD and 11 bits field for texture coordinates which is a total of 26 bits for a tag. This means K cannot be more than 22. The tag is 26 bits and the maximum for K is 22 bits but K is 22 bits when map level is 0 and since map level 0 is non mip map, map level 1 should be used. K would be 20 bits and would be less and less for LOD2 and 3. This means the higher the map level is the lower the coordination bit value would be and this combination will result in smaller key.

11. Regarding dependent claim 2, "...wherein said step (c) exploits an interrelationship between the number of possible values of said coordinate bits for some values of said mip-mapping-level-of-detail parameter." (Duluk disclose in col. 12 line 3-23).

12. Regarding independent claim 3, "a graphic processing method, comprising caching texture memory fetches using a cache tag assignment in which a unique relation defines a smaller tag address for any given memory address." Duluk disclose in col. 8 line 19-58, col., 11 lines 3-33 and Fig. 9.

13. Regarding dependent claim 4, "...wherein said cash tag assignment is generated by combining a mip-mapping-level-of-detail parameter which can have at least $2^{J-1}+1$ different values together with coordinate bits which can have as many as 2^k different

values into fewer than $J+K$ bits without loss of information." Duluk disclose in col. 8 line 19-58, col. 11 lines 3-33.

14. Regarding dependent claim 5, "...wherein said cash tag assignment is generated by combining a mip-mapping-level-of-detail parameter which can have at least $2^{J-1}+1$ different values together with coordinate bits which can have as many as 2^k different values into fewer than $J+K$ bits without loss of information; wherein said first parameter and said coordinate bits are three-dimensional coordinates." Duluk disclose in col. 8 line 19-58, col. 11 lines 3-33.

15. Regarding independent claim 6, "a method of generating condensed cash tags, comprising the steps of:

- a. Concatenating the texel address on the x- and y-axis with a map level identifier, where addresses on the x-axis can require m bits, addresses on the y-axis can require n bits, and said map-level identifier can require p bits (Duluk disclose in col. 17 lines 6-9);
- b. If two caches are being used for add/even maps, deleting the least significant bit of said map level identifier (Duluk disclose in col. 12 lines 24-41);
- c. If texels are being stored in the cache in $2^i \times 2^j$ patches, deleting the i least significant bits of the address on the x-axis and j least significant bits of the address on the y-axis (Duluk disclose in col. 9 lines 56-57); and
- d. Coding said map level identifier so that

the largest map level uses 1 bit to designate the map level and $((m-j)+(n-j))$ bits to specify said addresses on the x and y axis,
the second largest map level uses 3 bits to designate the map level and $((m-i)+(n-j)-2)$ bits to specify said addresses on the x and y axis,
successively smaller map levels use greater than 3 bits to designate the map level and less than $((m-j)+(n-j)-2)$ bits to specify said addresses on said x and y axis." Duluk disclose in abstract and also in col. 7 lines 47-62 and col. 8 line 19-59.

16. Regarding independent claim 7, "a cach system for a texture map comprising:
a texture memory containing at least one map, wherein the addresses for said map can require m bits for the x-axis, n bits for the y-axis, and p bits for the map-level identifier; and a direct-mapped texture cach for said texture memory, configured to be acceseed using lookup tags which requires $m+n-1$ or fewer bits." Duluk disclose in abstract and in col. 8 line 19-66.

Response to Arguments

17. The 112 (2) rejection to claim 1 has been withdrawn.
18. Applicant has argued in the remarks on page 16 that examiner's rejections under 112(1) has been traversed and believed to be moot in view of the amendment. The claims 1, 2, 4-7 are still rejected under 112(1) and are not traversed. For example, applicant has disclosed on page 50 line 8 of the specification "... the width of a texture map is given by (2^n+2b) where b is 0 for no border or 1 with a border." Similar

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description is needed for " $2^{J-1}+1$ " and " 2^K " in the specification. Also similar description is needed for the formula used in claim 7.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892 form.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Faranak Fouladi** whose telephone number is **703-305-3223**. The examiner can normally be reached on Mon-Fri from 8:00-4:30.

21. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Michael Razavi** can be reach at **703-305-4713**.

22. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks

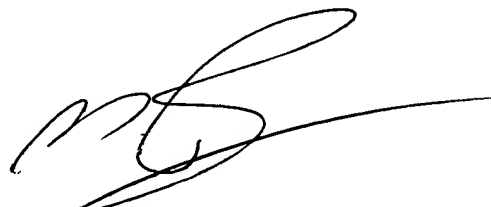
Washington, DC. 20231

Or faxed to: 703-872-9314 (for Technology Center 2600 only)

23. Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, sixth-floor (Receptionist).

24. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is 703-306-0377.

Faranak Fouladi-Semnani
Patent Examiner
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MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600